EV336518648US

10/542329

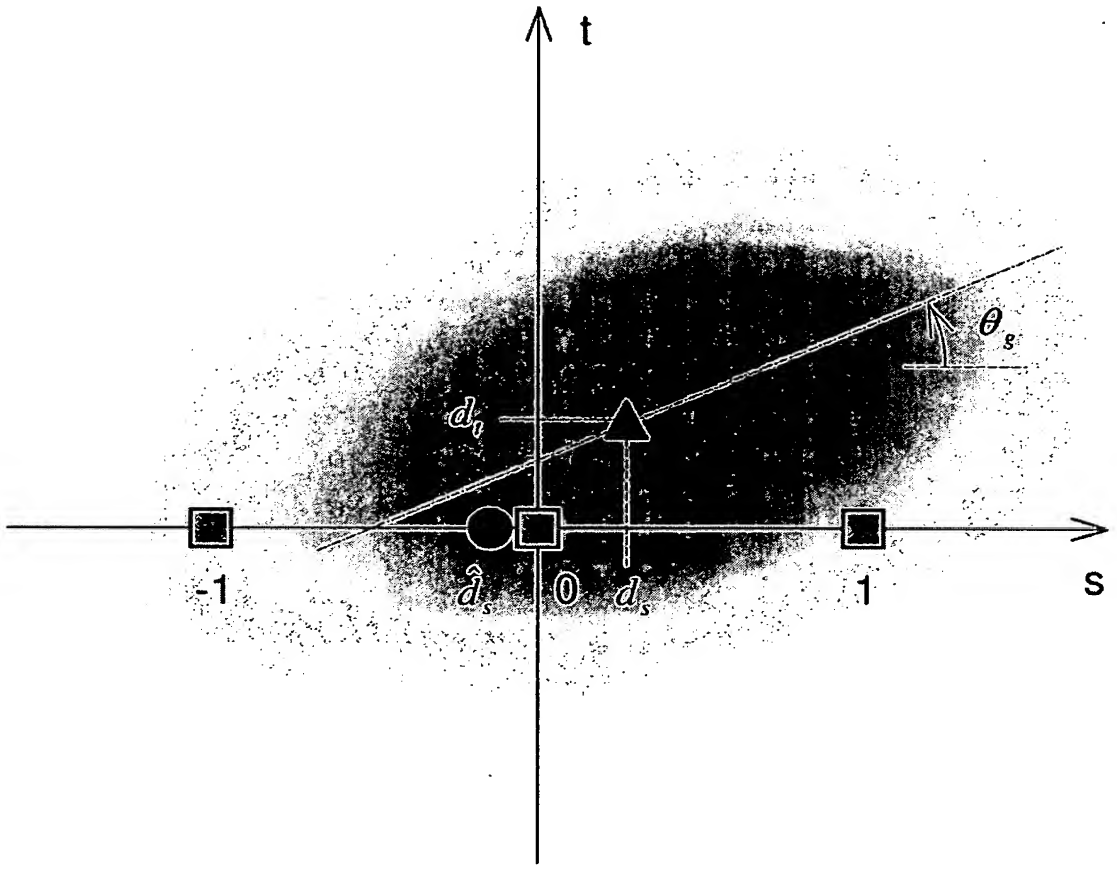
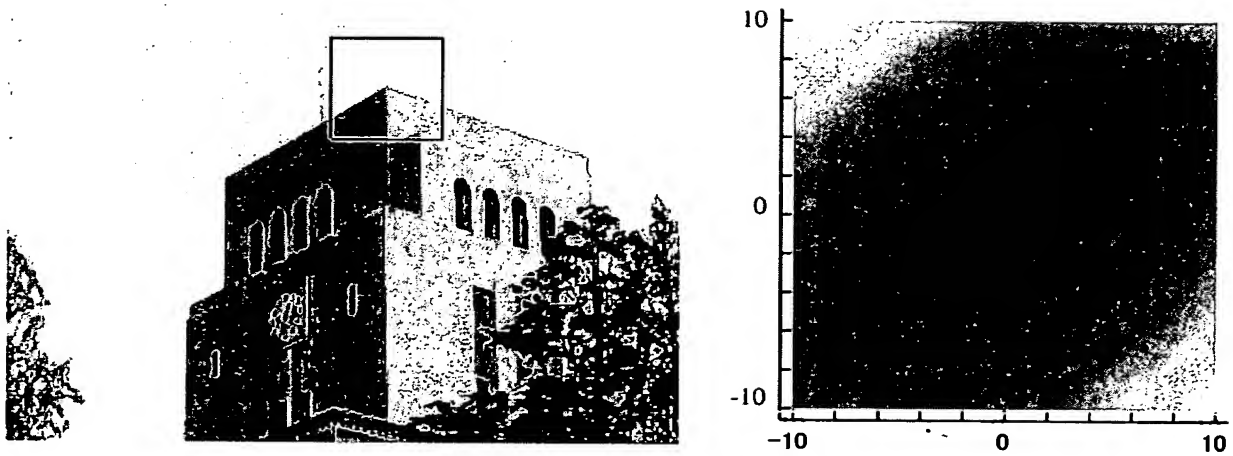
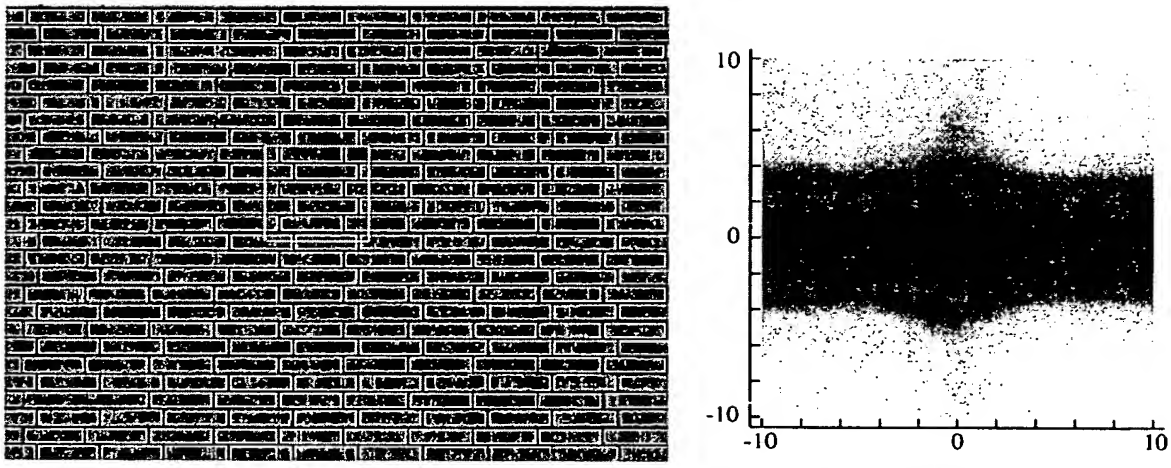


FIG.1



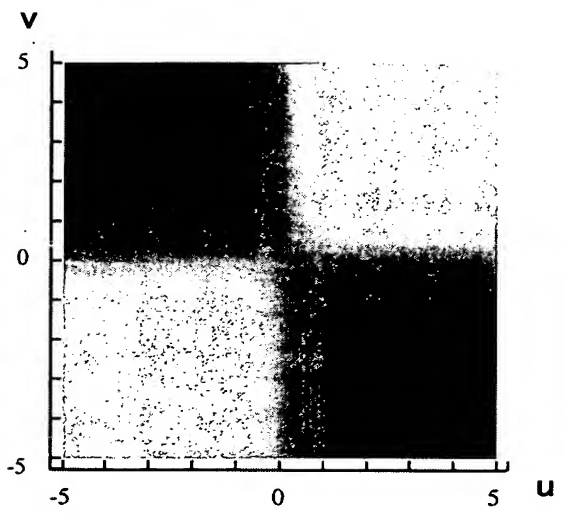
(a) IMAGE (b) SELF-SIMILARITY OF (a)

FIG.2

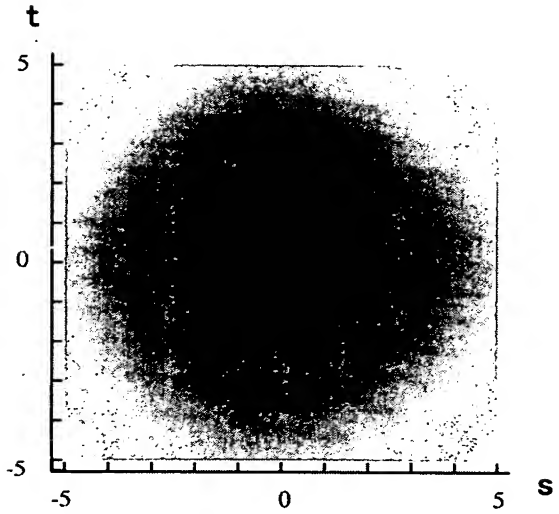


(a) IMAGE $\theta c = \pi/2$ (b) SELF-SIMILARITY OF (a)

FIG.3



(a) TWO-DIMENSIONAL IMAGE DENSITY



(b) TWO-DIMENSIONAL SIMILARITY

FIG.4

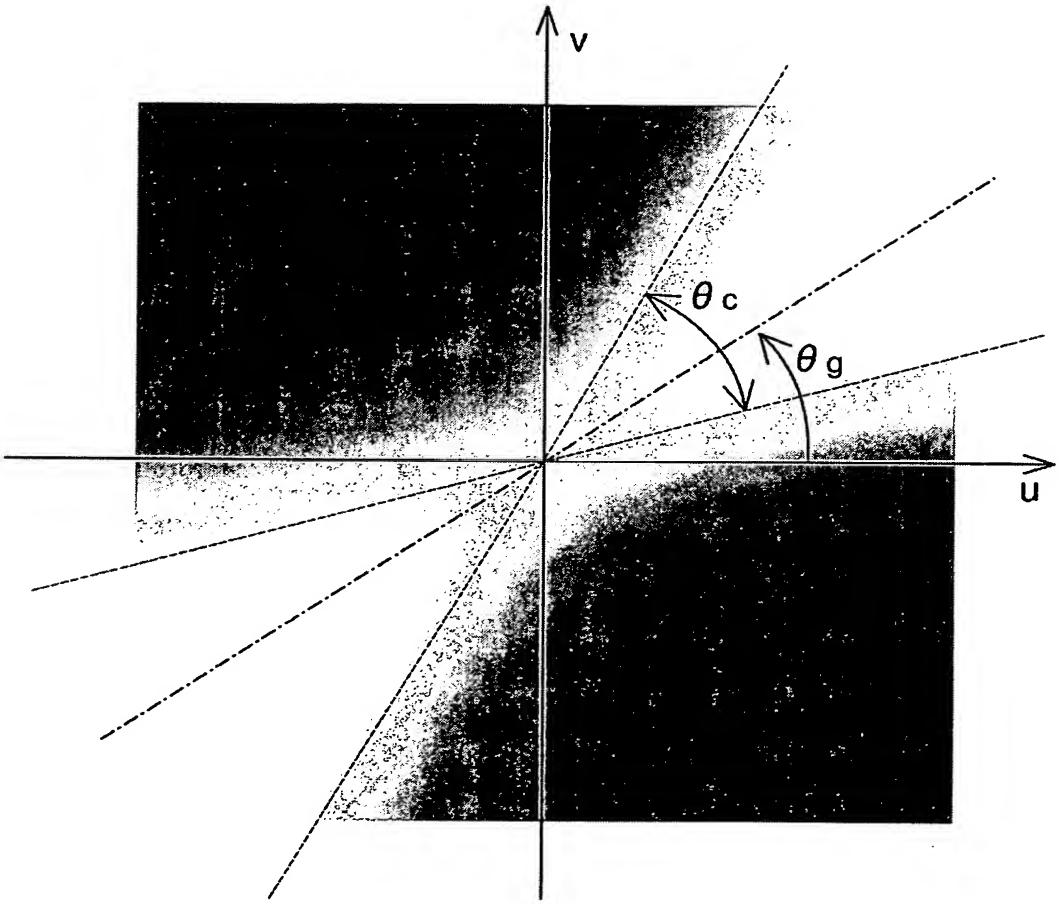
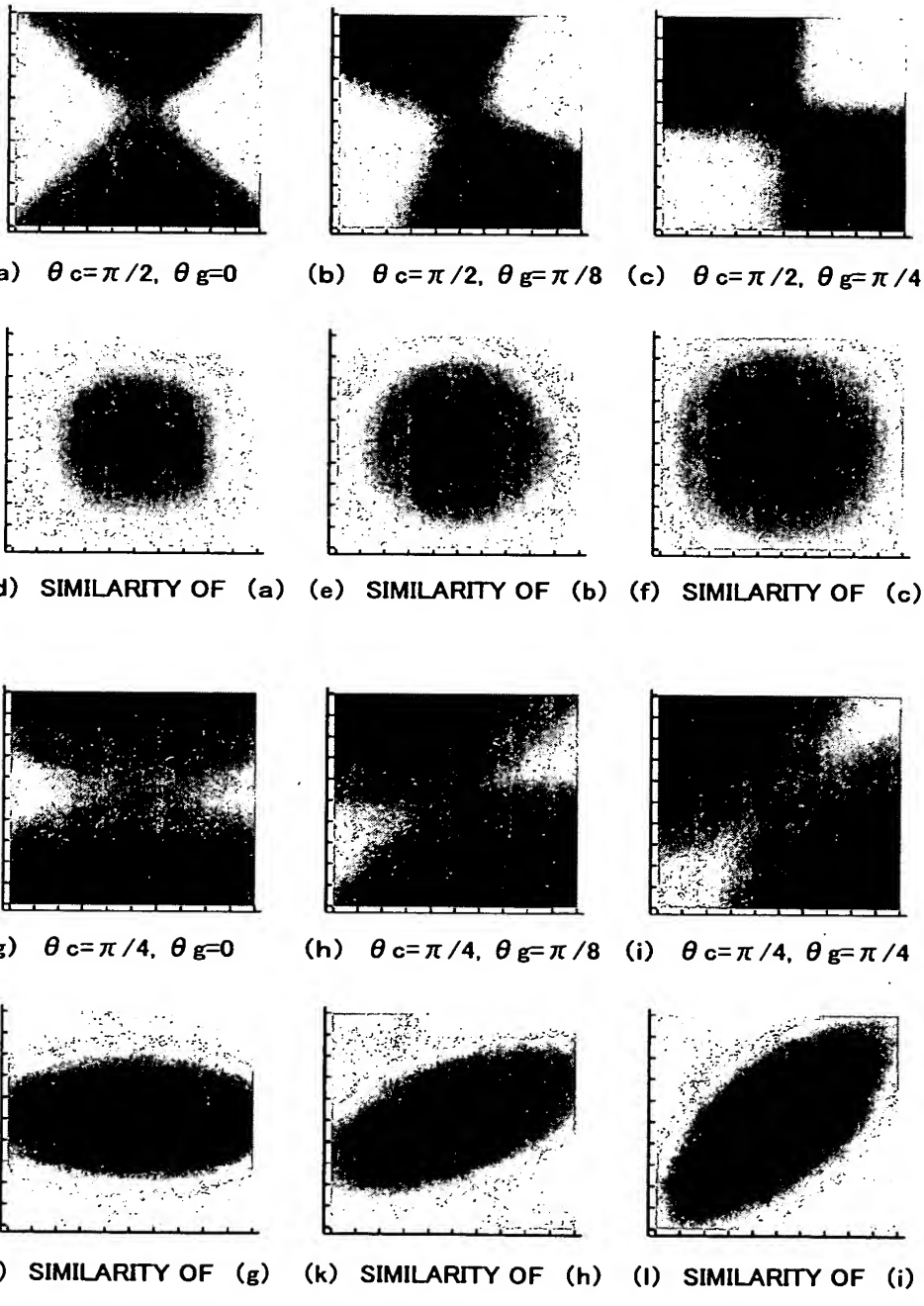


FIG.5



(a) $\theta c=\pi/2,\ \theta g=0$ (b) $\theta c=\pi/2,\ \theta g=\pi/8$ (c) $\theta c=\pi/2,\ \theta g=\pi/4$

(d) SIMILARITY OF (a) (e) SIMILARITY OF (b) (f) SIMILARITY OF (c)

(g) $\theta c=\pi/4,\ \theta g=0$ (h) $\theta c=\pi/4,\ \theta g=\pi/8$ (i) $\theta c=\pi/4,\ \theta g=\pi/4$

(j) SIMILARITY OF (g) (k) SIMILARITY OF (h) (l) SIMILARITY OF (i)

FIG.6

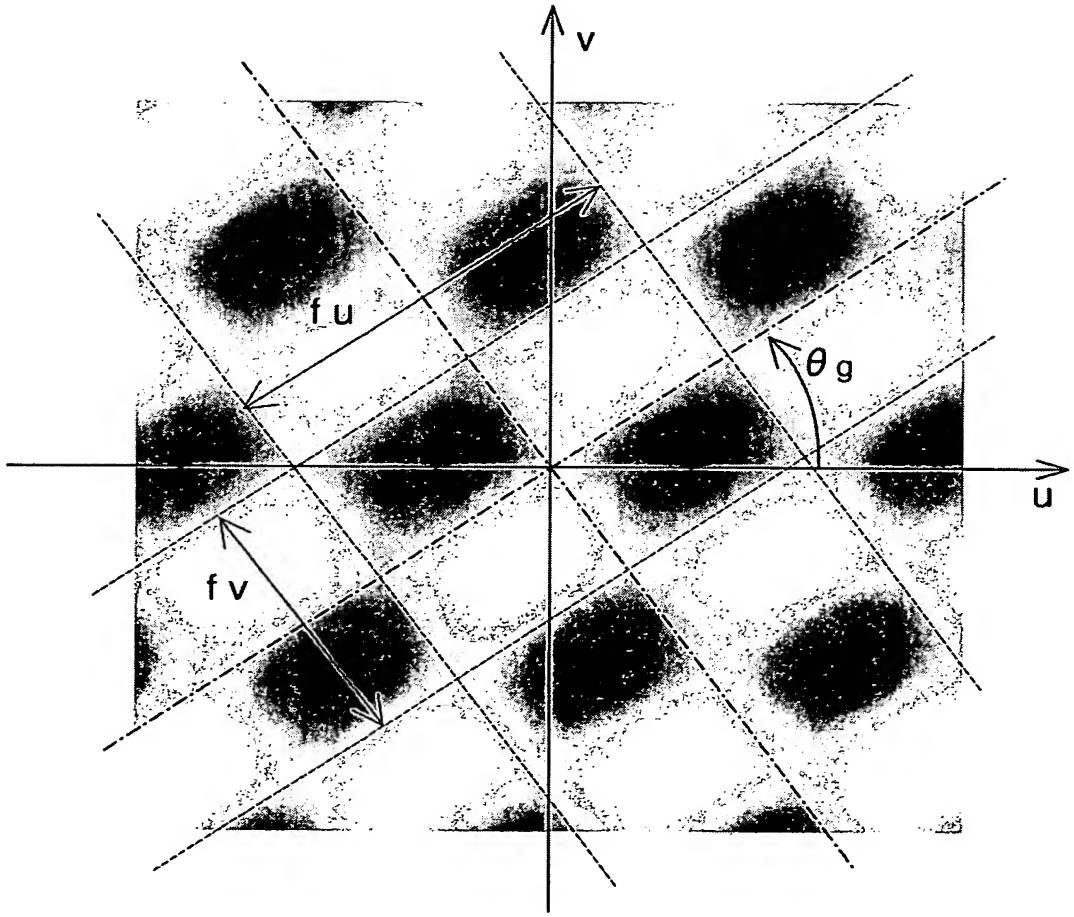
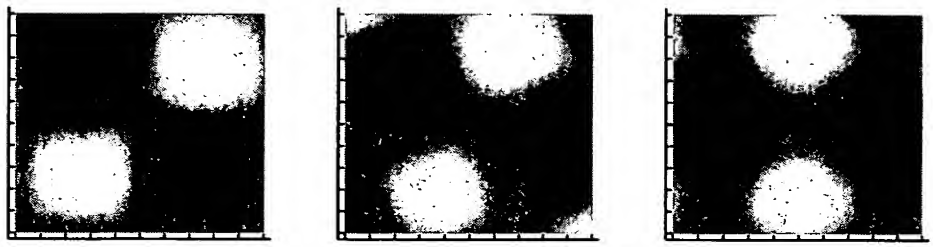
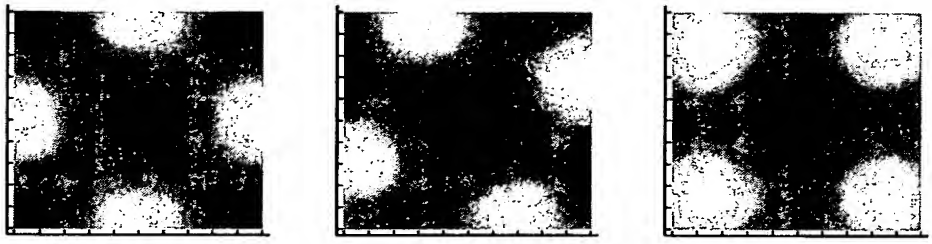


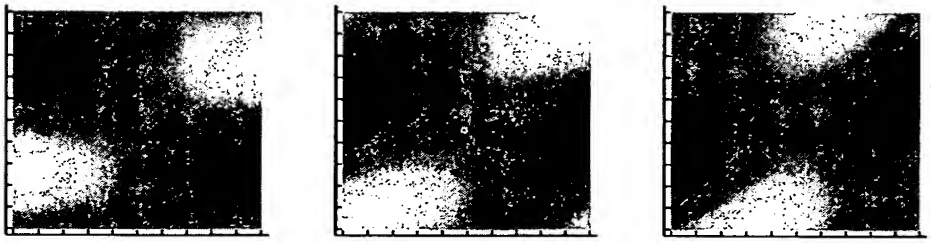
FIG.7



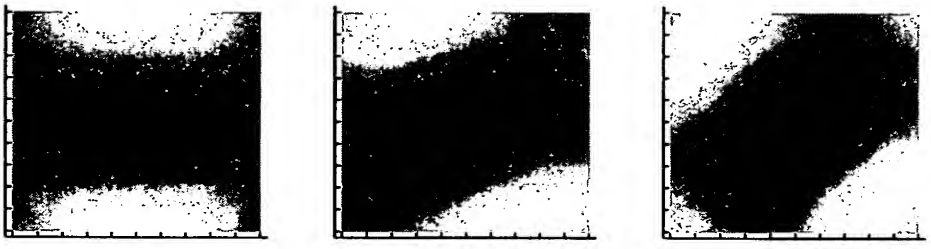
(a) fu=0.1, fv=0.1, θ g=0 (b) fu=0.1, fv=0.1, θ g=π/8 (c) fu=0.1, fv=0.1, θ g=π/4



(d) SIMILARITY OF (a) (e) SIMILARITY OF (b) (f) SIMILARITY OF (c)



(g) fu=0.05, fv=0.1, θ g=0 (h) fu=0.05, fv=0.1, θ g=π/8 (i) fu=0.05, fv=0.1, θ g=π/4



(j) SIMILARITY OF (g) (k) SIMILARITY OF (h) (l) SIMILARITY OF (i)

FIG.8

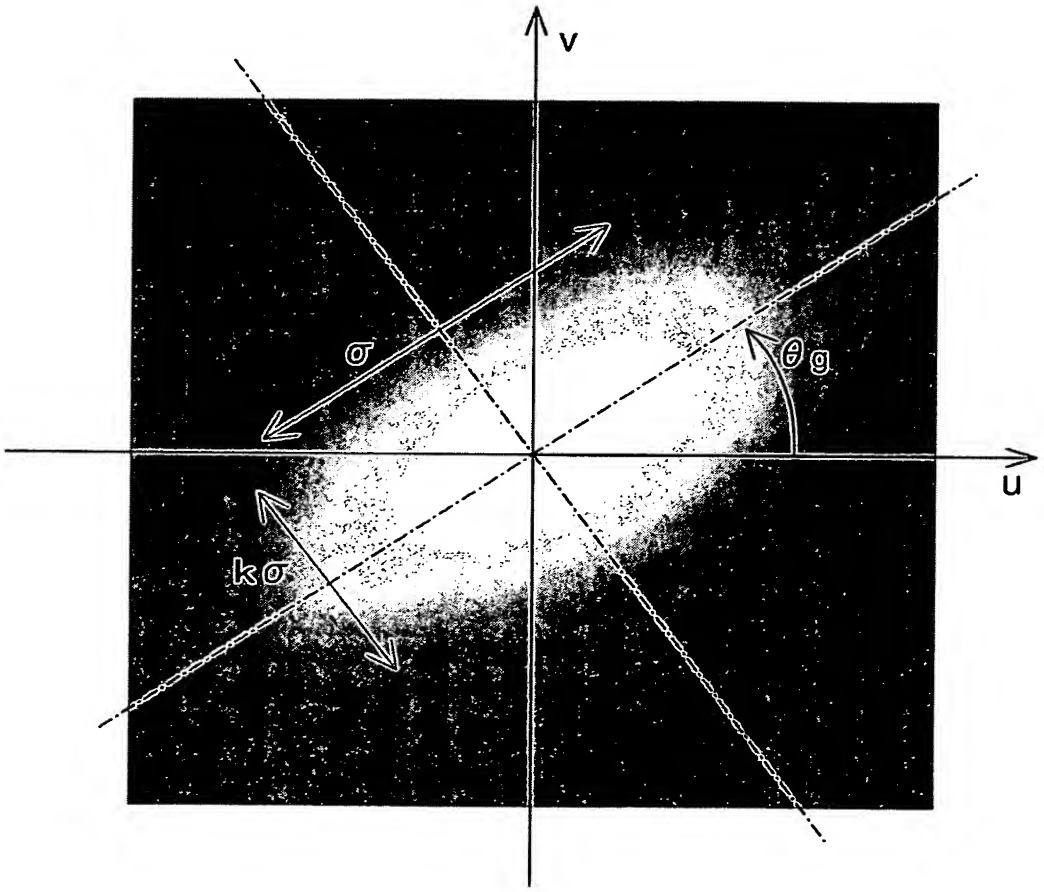


FIG.9

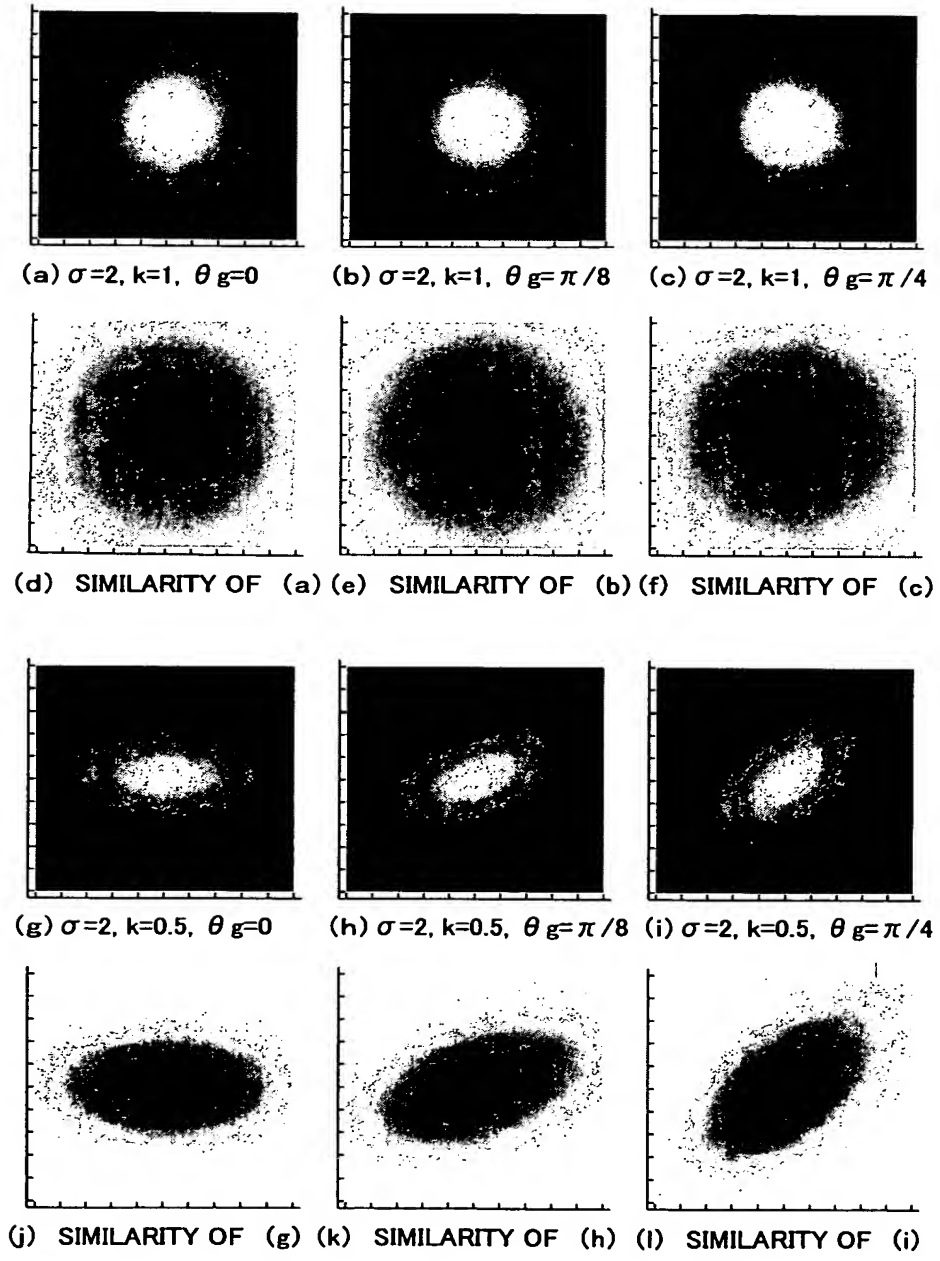
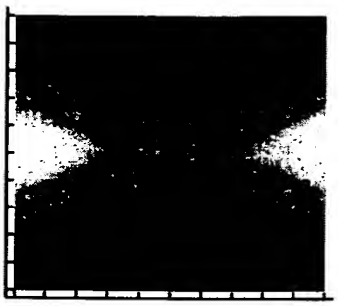
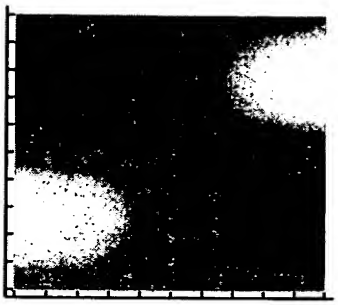

(a) σ=2, k=1, θg=0
(b) σ=2, k=1, θg=π/8
(c) σ=2, k=1, θg=π/4
(d) SIMILARITY OF (a)
(e) SIMILARITY OF (b)
(f) SIMILARITY OF (c)
(g) σ=2, k=0.5, θg=0
(h) σ=2, k=0.5, θg=π/8
(i) σ=2, k=0.5, θg=π/4
(j) SIMILARITY OF (g)
(k) SIMILARITY OF (h)
(l) SIMILARITY OF (i)

FIG.10

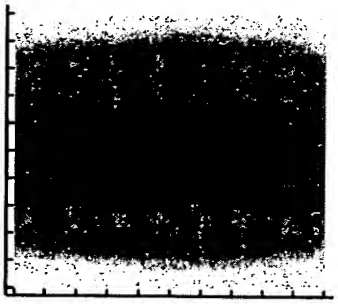


(a) σ=1, θ g=0, θ c=π/4

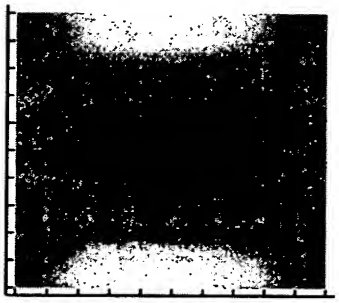


(b) fu=0.05, fv=0.1, θ g=0

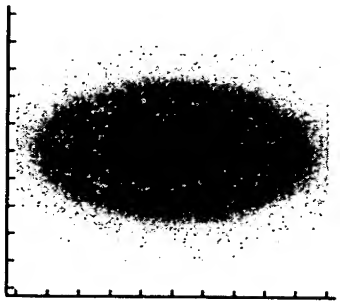
(c) σ=2, k=0.5, θ g=0



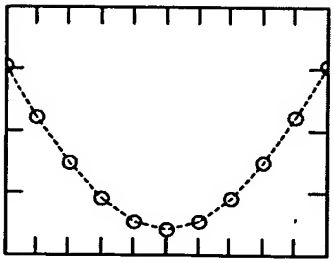
(d) SIMILARITY OF (a)



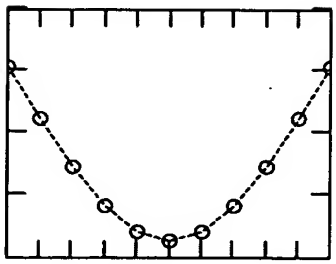
(e) SIMILARITY OF (b)



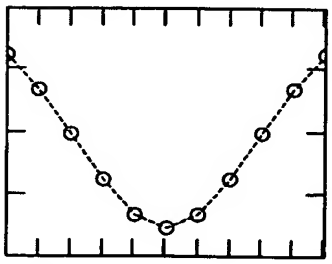
(f) SIMILARITY OF (c)



(g) PART OF (d)

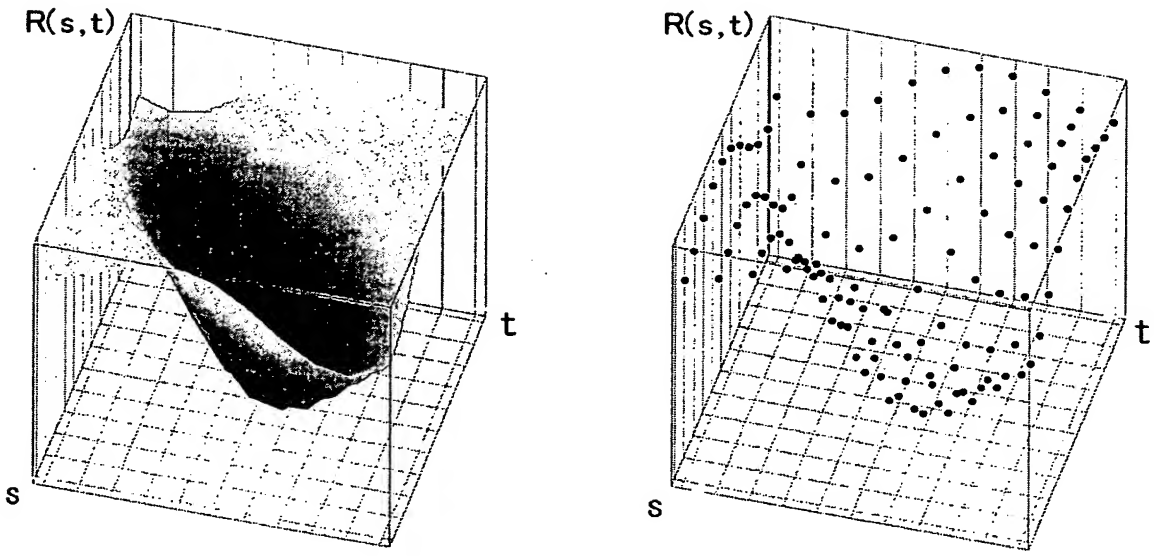


(h) PART OF (e)



(i) PART OF (f)

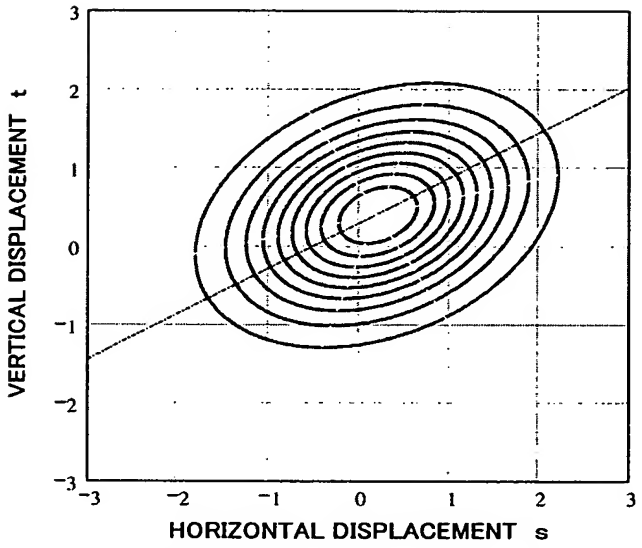
FIG.11



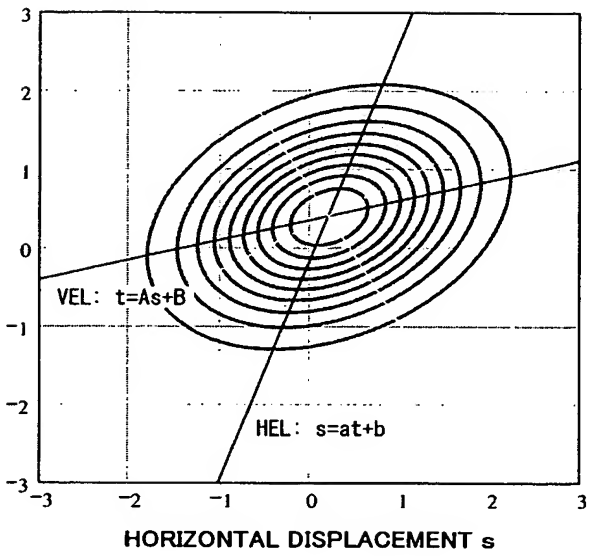
(a) SIMILARITY IN CONTINUOUS AREA

(b) SIMILARITY IN DISCRETE AREA

FIG.12

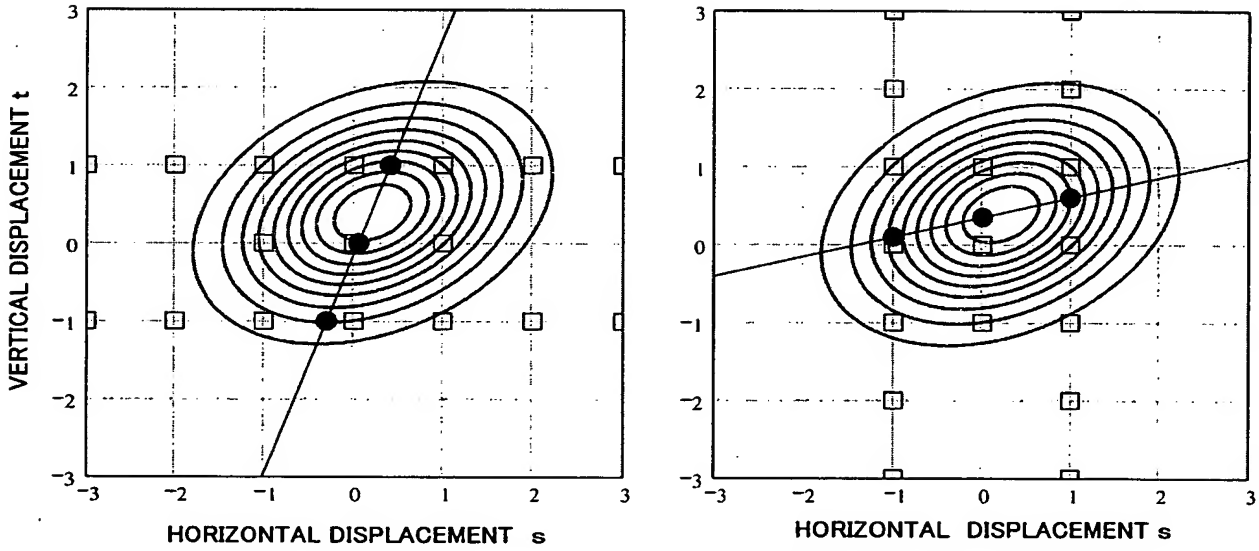


(a) TWO-DIMENSIONAL SIMILARITY MODEL AND ITS MAJOR AXIS



(b) HEL AND VEL

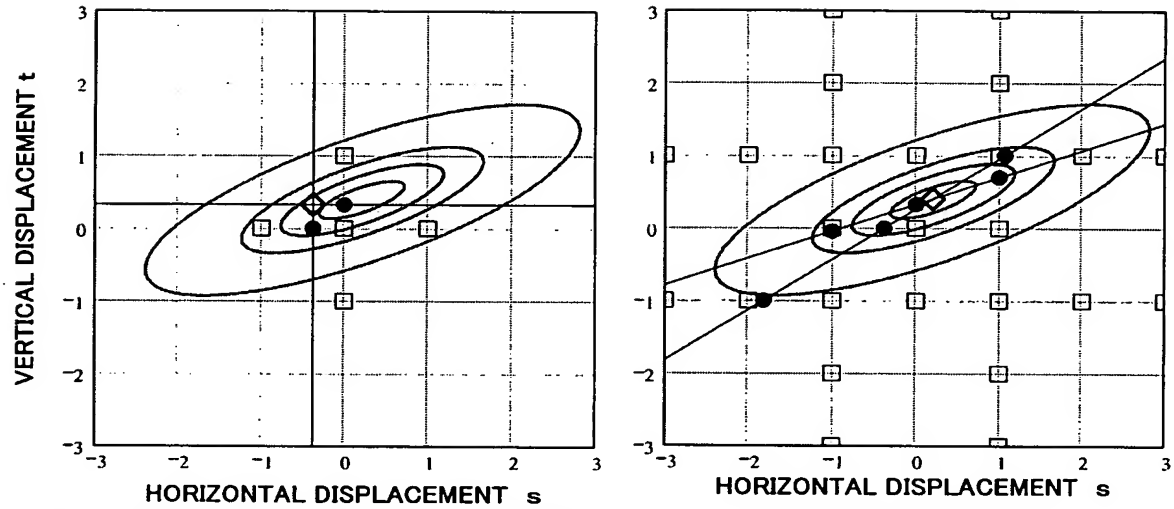
FIG.13



(a) HEL AND VALUE OF SAMPLED SIMILARITY

(b) VEL AND VALUE OF SAMPLED SIMILARITY

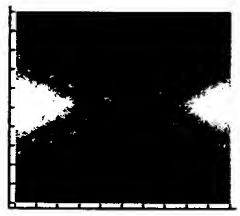
FIG.14



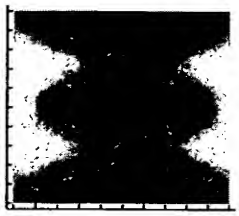
(a) TRADITIONAL ONE-DIMENSIONAL ESTIMATION

(b) TWO-DIMENSIONAL ESTIMATION ACCORDING TO THE PRESENT INVENTION

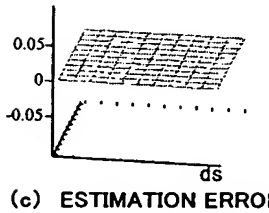
FIG.15



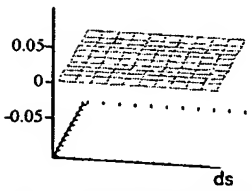
(a) IMAGE DENSITY



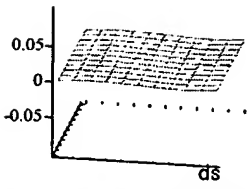
(b) SELF-SIMILARITY



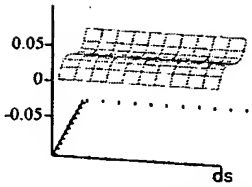
(c) ESTIMATION ERROR IN d_s DIRECTION



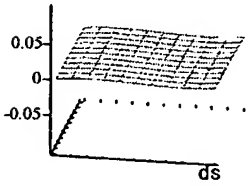
(d) ESTIMATION ERROR IN d_t DIRECTION



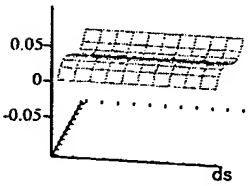
(e) ESTIMATION ERROR IN d_s DIRECTION



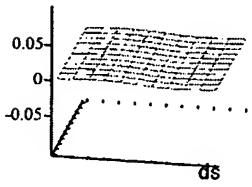
(f) ESTIMATION ERROR IN d_t DIRECTION



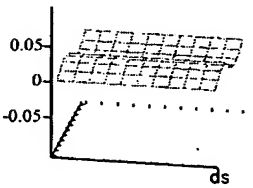
(g) ESTIMATION ERROR IN d_s DIRECTION



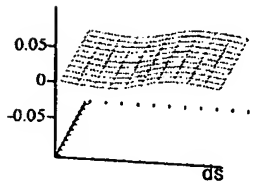
(h) ESTIMATION ERROR IN d_t DIRECTION



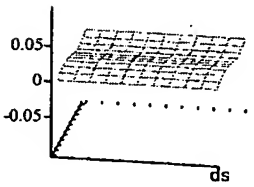
(i) ESTIMATION ERROR IN d_s DIRECTION



(j) ESTIMATION ERROR IN d_t DIRECTION



(k) ESTIMATION ERROR IN d_s DIRECTION

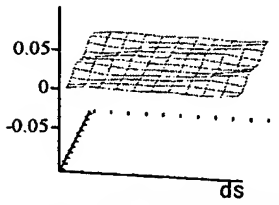


(l) ESTIMATION ERROR IN d_t DIRECTION

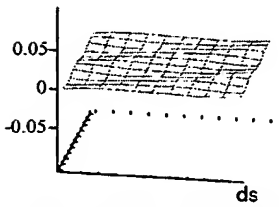
FIG.16

(a) IMAGE DENSITY

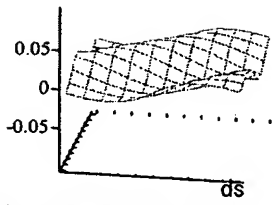
(b) SELF-SIMILARITY



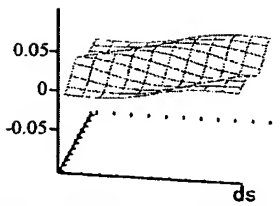
(c) ESTIMATION ERROR IN d_s DIRECTION



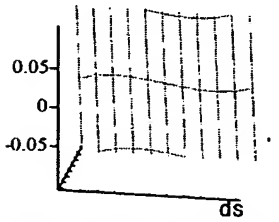
(d) ESTIMATION ERROR IN d_t DIRECTION



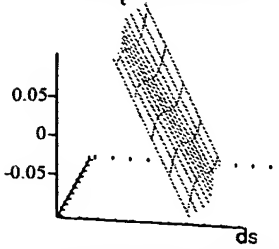
(e) ESTIMATION ERROR IN d_s DIRECTION



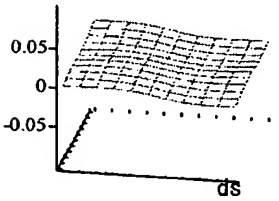
(f) ESTIMATION ERROR IN d_t DIRECTION



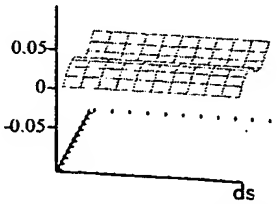
(g) ESTIMATION ERROR IN d_s DIRECTION



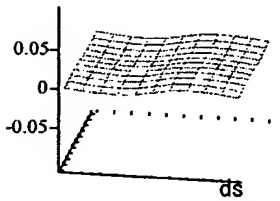
(h) ESTIMATION ERROR IN d_t DIRECTION



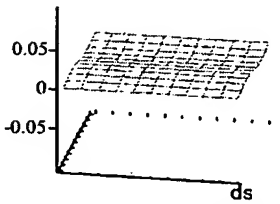
(i) ESTIMATION ERROR IN d_s DIRECTION



(j) ESTIMATION ERROR IN d_t DIRECTION



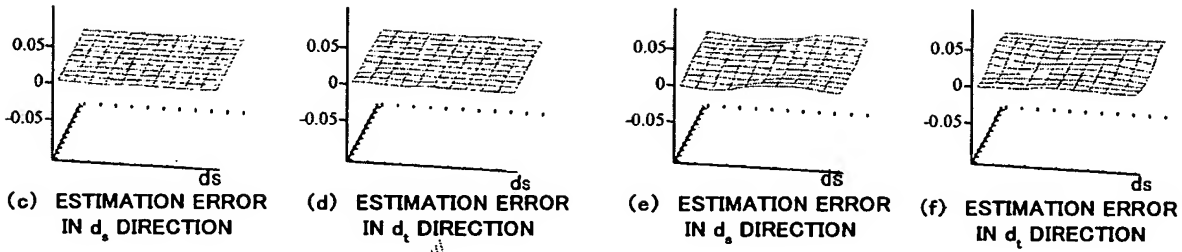
(k) ESTIMATION ERROR IN d_s DIRECTION



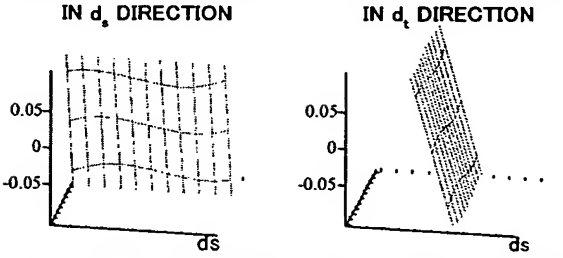
(l) ESTIMATION ERROR IN d_t DIRECTION

FIG.17

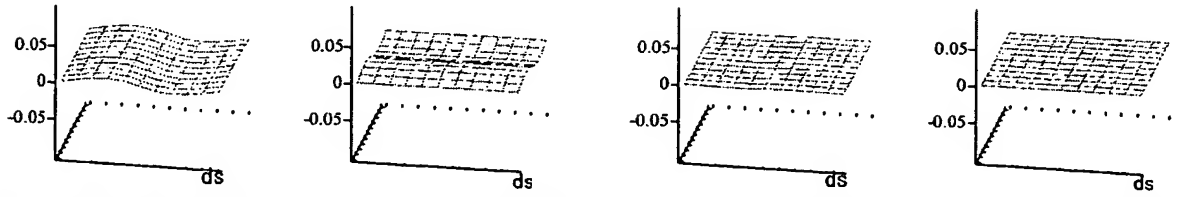
(a) IMAGE DENSITY (b) SELF-SIMILARITY



(c) ESTIMATION ERROR IN d_s DIRECTION (d) ESTIMATION ERROR IN d_t DIRECTION (e) ESTIMATION ERROR IN d_s DIRECTION (f) ESTIMATION ERROR IN d_t DIRECTION



(g) ESTIMATION ERROR IN d_s DIRECTION (h) ESTIMATION ERROR IN d_t DIRECTION



(i) ESTIMATION ERROR IN d_s DIRECTION (j) ESTIMATION ERROR IN d_t DIRECTION (k) ESTIMATION ERROR IN d_s DIRECTION (l) ESTIMATION ERROR IN d_t DIRECTION

FIG.18

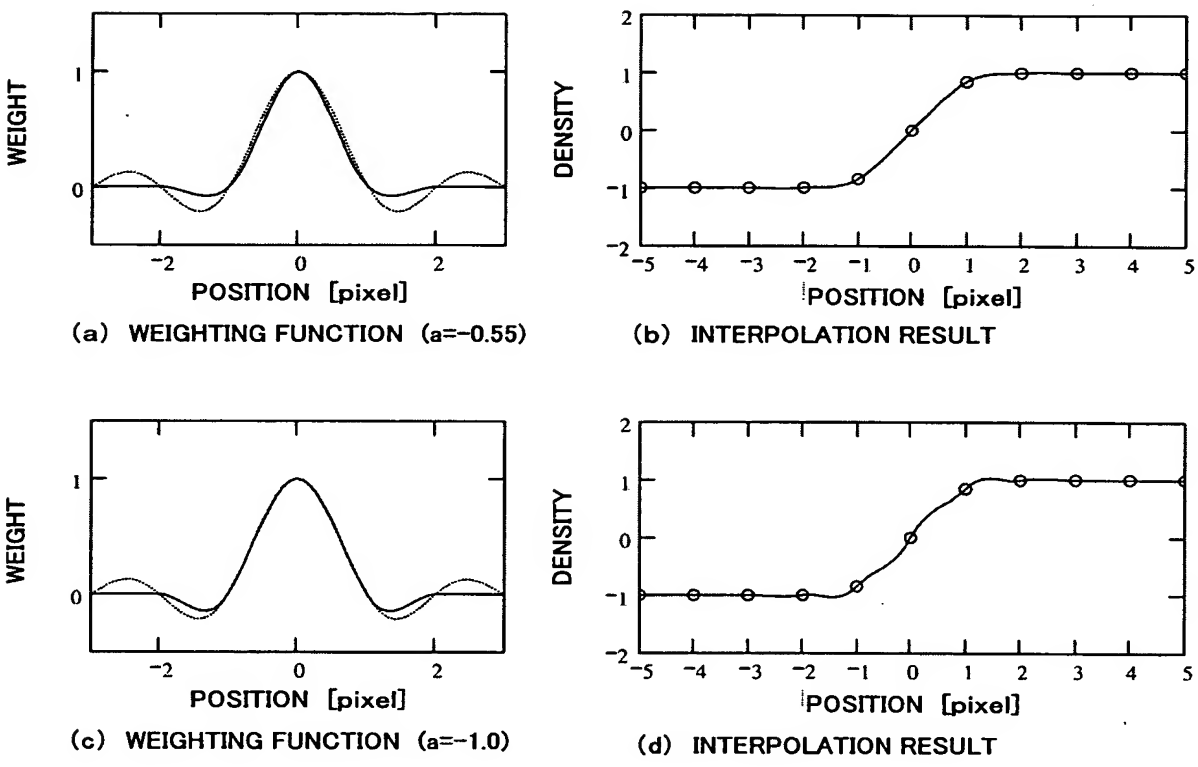
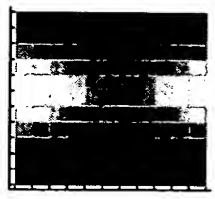
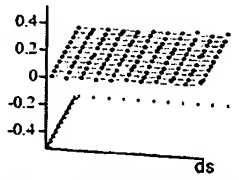

WEIGHT
1
0
-2
0
2
POSITION [pixel]
(a) WEIGHTING FUNCTION (a=-0.55)
DENSITY
2
1
0
-1
-2
-5 -4 -3 -2 -1 0 1 2 3 4 5
POSITION [pixel]
(b) INTERPOLATION RESULT
WEIGHT
1
0
-2
0
2
POSITION [pixel]
(c) WEIGHTING FUNCTION (a=-1.0)
DENSITY
2
1
0
-1
-2
-5 -4 -3 -2 -1 0 1 2 3 4 5
POSITION [pixel]
(d) INTERPOLATION RESULT

FIG.19

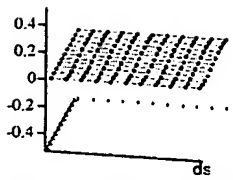


(a) IMAGE DENSITY

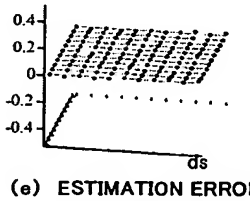
(b) SELF-SIMILARITY



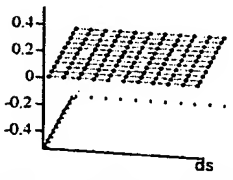
(c) ESTIMATION ERROR IN d_s DIRECTION



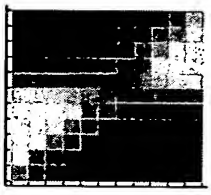
(d) ESTIMATION ERROR IN d_t DIRECTION



(e) ESTIMATION ERROR IN d_s DIRECTION

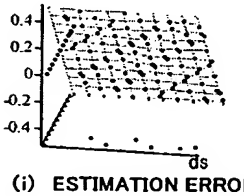


(f) ESTIMATION ERROR IN d_t DIRECTION

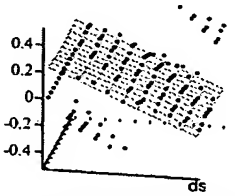


(g) IMAGE DENSITY

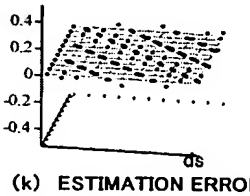
(h) SELF-SIMILARITY



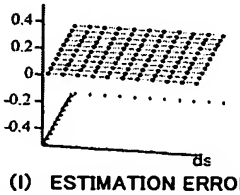
(i) ESTIMATION ERROR IN d_s DIRECTION



(j) ESTIMATION ERROR IN d_t DIRECTION



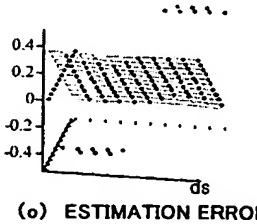
(k) ESTIMATION ERROR IN d_s DIRECTION



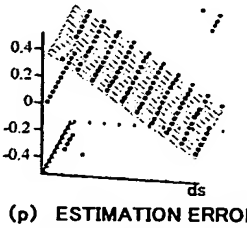
(l) ESTIMATION ERROR IN d_t DIRECTION

(m) IMAGE DENSITY

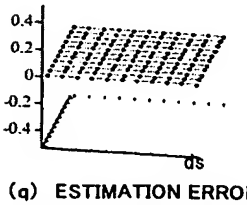
(n) SELF-SIMILARITY



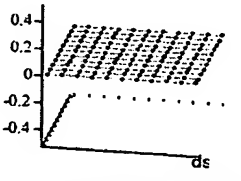
(o) ESTIMATION ERROR IN d_s DIRECTION



(p) ESTIMATION ERROR IN d_t DIRECTION



(q) ESTIMATION ERROR IN d_s DIRECTION



(r) ESTIMATION ERROR IN d_t DIRECTION

FIG.20

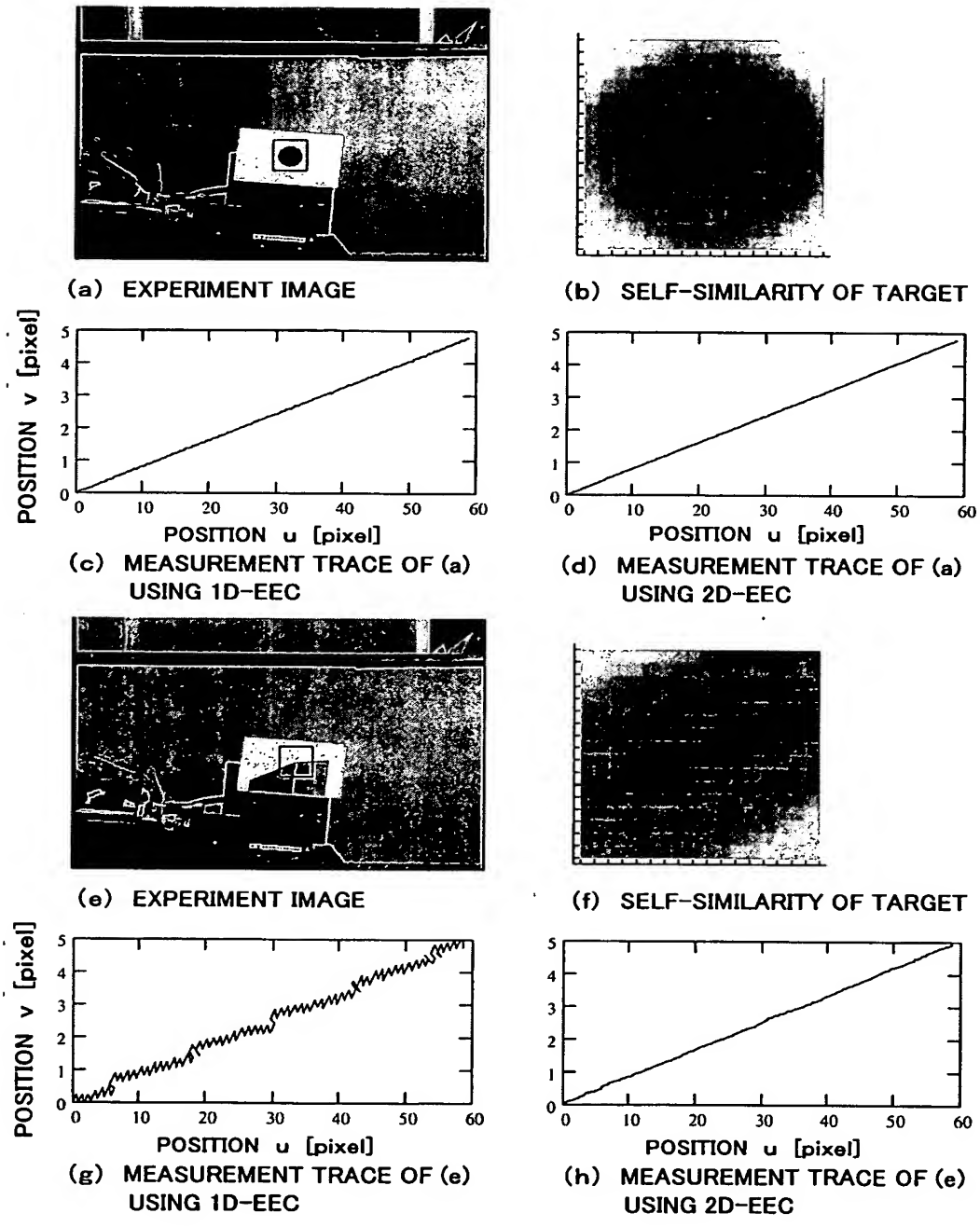

(a) EXPERIMENT IMAGE
(b) SELF-SIMILARITY OF TARGET
POSITION v [pixel]
POSITION u [pixel]
(c) MEASUREMENT TRACE OF (a) USING 1D-EEC
(d) MEASUREMENT TRACE OF (a) USING 2D-EEC
(e) EXPERIMENT IMAGE
(f) SELF-SIMILARITY OF TARGET
POSITION v [pixel]
POSITION u [pixel]
(g) MEASUREMENT TRACE OF (e) USING 1D-EEC
(h) MEASUREMENT TRACE OF (e) USING 2D-EEC

FIG.21

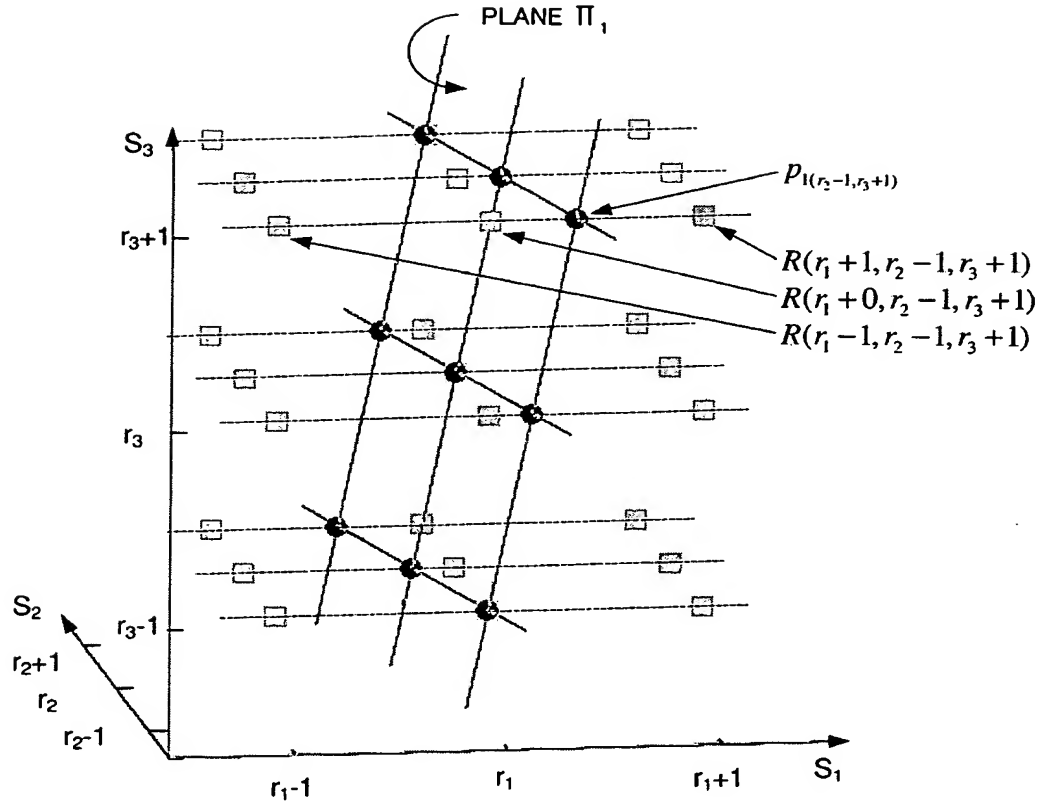

PLANE Π_1
S_3
r_3+1
r_3
r_3-1
S_2
r_2+1
r_2
r_2-1
r_1-1
r_1
r_1+1
S_1
$P_{1(r_2-1,r_3+1)}$
$R(r_1+1, r_2-1, r_3+1)$
$R(r_1+0, r_2-1, r_3+1)$
$R(r_1-1, r_2-1, r_3+1)$

FIG.22

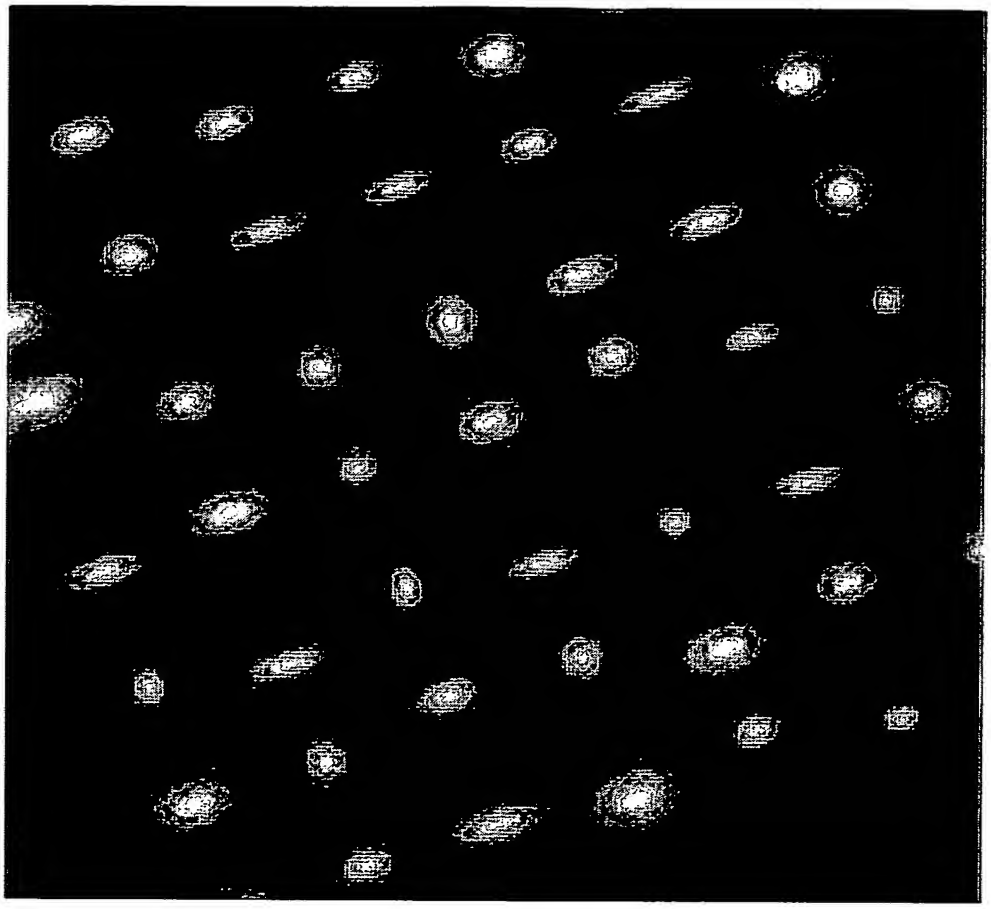


FIG.23

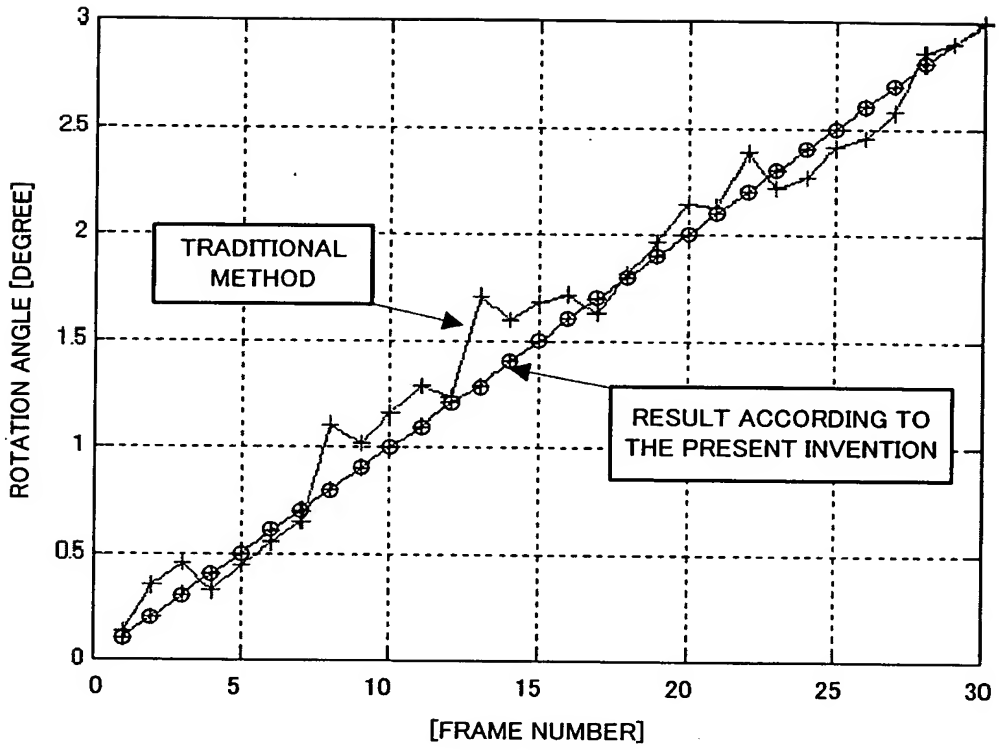

ROTATION ANGLE [DEGREE]
[FRAME NUMBER]
TRADITIONAL METHOD
RESULT ACCORDING TO THE PRESENT INVENTION
0
0.5
1
1.5
2
2.5
3
0
5
10
15
20
25
30

FIG.24

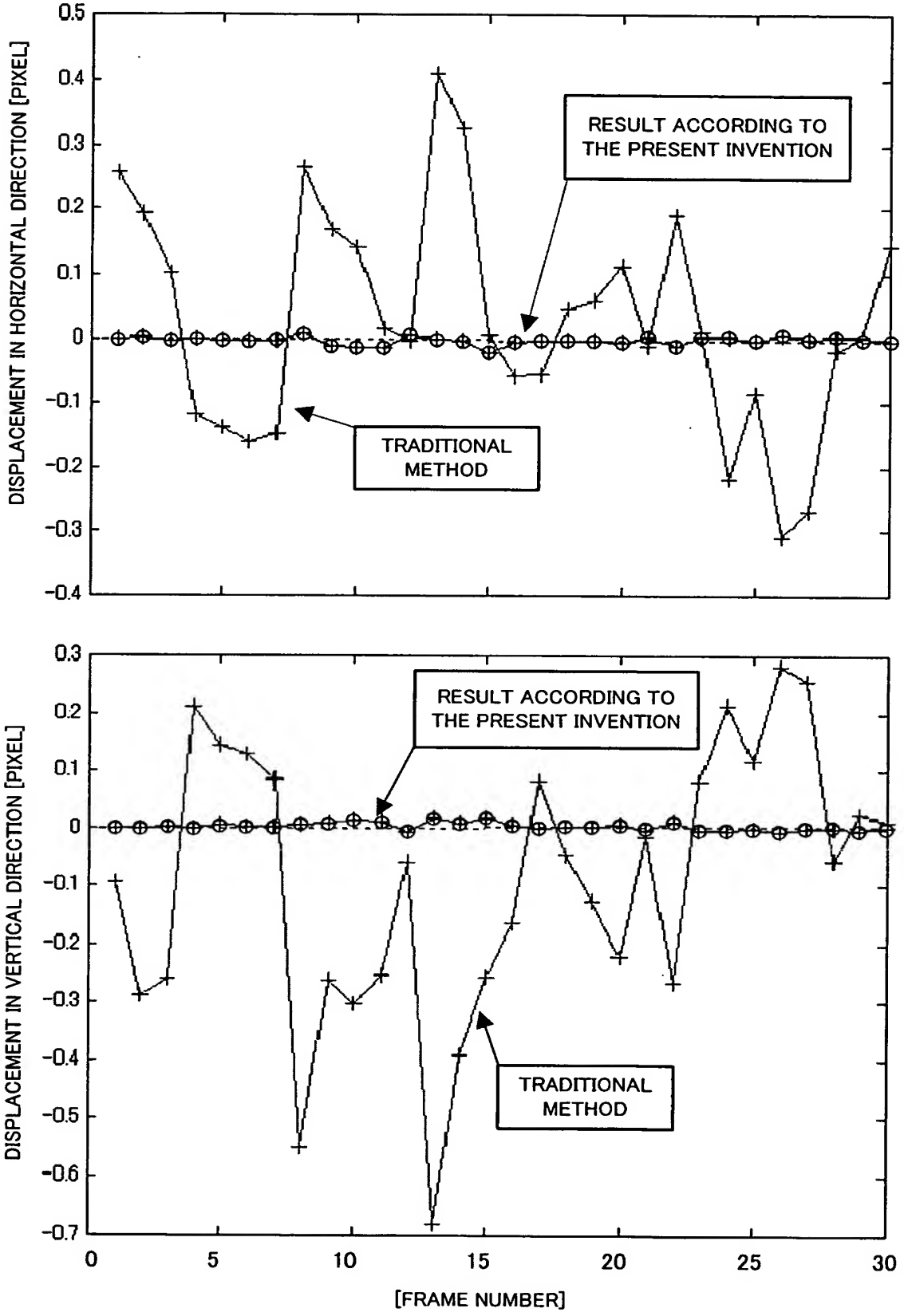

DISPLACEMENT IN HORIZONTAL DIRECTION [PIXEL]
0.5
0.4
0.3
0.2
0.1
0
-0.1
-0.2
-0.3
-0.4
RESULT ACCORDING TO THE PRESENT INVENTION
TRADITIONAL METHOD
DISPLACEMENT IN VERTICAL DIRECTION [PIXEL]
0.3
0.2
0.1
0
-0.1
-0.2
-0.3
-0.4
-0.5
-0.6
-0.7
RESULT ACCORDING TO THE PRESENT INVENTION
TRADITIONAL METHOD
0
5
10
15
20
25
30
[FRAME NUMBER]

FIG.25